We claim:

1. A method of decentralized medium access control in a communications network including at least one wireless device (401), comprising the steps of:

dividing time into a sequence of at least one superframe (100) comprising at least one dynamic beacon period (301) and at least one data transmission period (102), said dynamic beacon period (301) having a predetermined maximum length and including a variable plurality of beacon slots (204);

beaconing by transmission of a beacon frame (600) in a unique one of said plurality of beacon slots (204) by every device (401) in an awake state, said beacon frame (600) including information (604); and

grouping said plurality of beacon slots (204) into at least one contiguous dynamic beacon period (301).

2. The method of claim 1, further comprising the step of said dynamic beacon period 301 dynamically expanding or shrinking in length by a multiple N $\geq$1 of beacon slots (204) within said predetermined maximum size in accordance with the number of occupied beacon slots.

3. The method of claim 2, further comprising the steps of:

receiving by each beaconing device (401) beacons (600) transmitted by other devices (401) within a radio range of the beaconing device (401); and

each beaconing device (401) autonomously determining the length of said at least one contiguous dynamic beacon period (301) in which it is beaconing based on the received beacons (600) from other devices (401) and information (604) included in said received beacons.

4. The method of claim 3, further comprising the steps of:

determining a last occupied beacon slot of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600);

a joining device (401) transmitting its beacon (600) in a free beacon slot (204) of said at least one contiguous dynamic beacon period (301);

detecting by a device (401) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in a free beacon slot (204) of a dynamic beacon period (301).

5. The method of claim 4, wherein said free beacon slot (204) is a first free beacon slot after the last occupied beacon slot.

6. The method of claim 4, wherein said free beacon slot (204) is a randomly-chosen free slot within a pre-determined number of beacon slots after the last occupied beacon slot.

7. The method of claim 1 further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600).

a joining device transmitting (401) its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303);

detecting by a device (401) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303).

8. The method of claim 2, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) as a special purpose slot (302) (303);

determining at least one free beacon slot of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600);

a joining device transmitting its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303);

detecting by a device that its beacon (600) has collided with a beacon (600)of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device(401) subsequently transmitting its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303).

9. The method of claim 3, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons(600) received from other devices (401) and information (604) included in said received beacons (600);

a joining device (401) transmitting its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303);

detecting by a device (401) that its beacon has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in any free beacon slot (204) other than a free beacon slot that is a special purpose slot (302) (303).

10. The method of claim 1 further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons;

a joining device (401) transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303);

detecting by a device (401) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303).

11. The method of claim 2, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons;

a joining device (401) transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303);

detecting by a device (401) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303).

12. The method of claim 3, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons;

a joining device (401) transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303);

detecting by a device (401) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently transmitting its beacon (600) in any free beacon slot (204) that is a special purpose slot (302) (303).

13. The method of claim 10, further comprising the steps of:

a joining device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot (302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301); and

a detecting device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot(302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301).

14. The method of claim 11, further comprising the steps of:

a joining device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot (302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301); and

a detecting device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot(302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301).

15. The method of claim 12, further comprising the steps of:

a joining device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot (302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301); and

a detecting device (401) performing the steps of-

a. transmitting its beacon (600) in a special purpose slot(302) (303) for at least one superframe (100), and

b. thereafter moving its beacon (600) to a different free beacon slot (204) in the at least one contiguous dynamic beacon period (301).

16. The method of claim 1, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices and information (604) included in said received beacons; and

a joining device (401) simultaneously transmitting its beacon (600) in the determined at least one free beacon slot(204) and in a special purpose slot (302) (303) for a predetermined number of superframes (100).

17. The method of claim 2, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices and information.(604) included in said received beacons; and

a joining device (401) simultaneously transmitting its beacon (600) in the determined at least one free beacon slot(204) and in a special purpose slot (302) (303) for a predetermined number of superframes (100).

18. The method of claim 3, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices and information (604) included in said received beacons; and

a joining device (401) simultaneously transmitting its beacon (600) in the determined at least one free beacon slot(204) and in a special purpose slot (302) (303) for a predetermined number of superframes (100).

19. The method of claim 1, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600);

detecting by a device (400) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently performing the steps of-

a. simultaneously transmitting its beacon (600) in its previous beacon slot and in one of the determined at least one free beacon slot (204) for a predetermined number of superframes, and

b. after said simultaneous transmission, only ceasing transmission of a beacon in its previous beacon slot.

20. The method of claim 2, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600);

detecting by a device (400) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently performing the steps of-

a. simultaneously transmitting its beacon (600) in its previous beacon slot and in one of the determined at least one free beacon slot (204) for a predetermined number of superframes, and

b. after said simultaneous transmission, only ceasing transmission of a beacon in its previous beacon slot.

21. The method of claim 3, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600);

detecting by a device (400) that its beacon (600) has collided with a beacon (600) of another device (401); and

when a device (401) has detected that its beacon (600) has collided with a beacon (600) of another device (401), said detecting device (401) subsequently performing the steps of-

a. simultaneously transmitting its beacon (600) in its previous beacon slot and in one of the determined at least one free beacon slot (204) for a predetermined number of superframes, and

b. after said simultaneous transmission, only ceasing transmission of a beacon in its previous beacon slot.

22. The method of claim 1, further comprising the steps of:

determining a next free beacon slot (204) in the direction of a beginning of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (600) and information (604) included in said received beacons (600); and

a device (401), that has already transmitted at least one beacon (600), moving its beacon from its previous beacon slot to the determined next free beacon slot (204).

23. The method of claim 2, further comprising the steps of:

determining a next free beacon slot (204) in the direction of a beginning of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (600) and information (604) included in said received beacons (600); and

a device (401), that has already transmitted at least one beacon (600), moving its beacon from its previous beacon slot to the determined next free beacon slot (204).

24. The method of claim 3, further comprising the steps of:

determining a next free beacon slot (204) in the direction of a beginning of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (600) and information (604) included in said received beacons (600); and

a device (401), that has already transmitted at least one beacon (600), moving its beacon from its previous beacon slot to the determined next free beacon slot (204).

25. The method of claim 22 wherein said determining step further comprises jumping over any occupied beacon slot (204) that is one of not able to move and not willing to move.

26. The method of claim 23 wherein said determining step further comprises jumping over any occupied beacon slot (204) that is one of not able to move and not willing to move.

27. The method of claim 24 wherein said determining step further comprises jumping over any occupied beacon slot (204) that is one of not able to move and not willing to move.

28. The method of claim 1 further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period(301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on a slot not being a special purpose slot (302) (303) and beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a beaconing device moving its beacon (600) to the determined at least one free beacon slot (204).

29. The method of claim 2 further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period(301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on a slot not being a special purpose slot (302) (303) and beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a beaconing device moving its beacon (600) to the determined at least one free beacon slot (204).

30. The method of claim 3 further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period(301) as a special purpose slot (302) (303);

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period (301) based on a slot not being a special purpose slot (302) (303) and beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a beaconing device moving its beacon (600) to the determined at least one free beacon slot (204).

31. The method of claim 1, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period based (301) on beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a device (600), that has already transmitted at least one beacon (600), performing the steps of:

a. ascertaining that the beacon slot (204) of the device is the last beacon slot of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600), and

b. when the device (401) ascertains that its beacon slot (204) is the last beacon slot, moving its beacon (600) from its previous beacon slot to the determined at least one free beacon slot (204).

32. The method of claim 2, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period based (301) on beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a device (600), that has already transmitted at least one beacon (600), performing the steps of:

a. ascertaining that the beacon slot (204) of the device is the last beacon slot of said at least one contiguous dynamic beacon period (301)

based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600), and

b. when the device (401) ascertains that its beacon slot (204) is the last beacon slot, moving its beacon (600) from its previous beacon slot to the determined at least one free beacon slot (204).

33. The method of claim 3, further comprising the steps of:

determining at least one free beacon slot (204) of said at least one contiguous dynamic beacon period based (301) on beacons (600) received from other devices (401) and information (604) included in said received beacons (600); and

a device (600), that has already transmitted at least one beacon (600), performing the steps of:

a. ascertaining that the beacon slot (204) of the device is the last beacon slot of said at least one contiguous dynamic beacon period (301) based on beacons (600) received from other devices (401) and information (604) included in said received beacons (600), and

b. when the device (401) ascertains that its beacon slot (204) is the last beacon slot, moving its beacon (600) from its previous beacon slot to the determined at least one free beacon slot (204).

34. The method of claim 28, wherein the determining step further comprises the step of determining said at least one free beacon slot (204) as the first beacon slot in the at least one contiguous dynamic beacon period (301) after a beginning of the at least one contiguous dynamic beacon period (301).

35. The method of claim 29, wherein the determining step further comprises the step of determining said at least one free beacon slot (204) as the first beacon slot in the at least one contiguous dynamic beacon period (301) after a beginning of the at least one contiguous dynamic beacon period (301).

36. The method of claim 30, wherein the determining step further comprises the step of determining said at least one free beacon slot (204) as the first beacon slot in the at least one contiguous dynamic beacon period (301) after a beginning of the at least one contiguous dynamic beacon period (301).

37. The method of claim 22, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in the determined at least one free beacon slot for a predetermined number of superframes.

38. The method of claim 25, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in the determined at least one free beacon slot for a predetermined number of superframes.

39. The method of claim 28, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in the determined at least one free beacon slot for a predetermined number of superframes.

40. The method of claim 31, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in the determined at least one free beacon slot for a predetermined number of superframes.

41. The method of claim 34, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in the determined at least one free beacon slot for a predetermined number of superframes.

42. The method of claim 22, further comprising the step of prior to said moving step the device performing the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

transmitting a beacon (600) in a special purpose slot (302) (303).

43. The method of claim 25, further comprising the step of prior to said moving step the device performing the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

transmitting a beacon (600) in a special purpose slot (302) (303).

44. The method of claim 28, further comprising the step of prior to said moving step transmitting a beacon in a special purpose slot (302) (303).

45. The method of claim 31, further comprising the step of prior to said moving step the device performing the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

transmitting a beacon (600) in a special purpose slot (302) (303).

46. The method of claim 34, further comprising the step of prior to said moving step transmitting a beacon (600) in a special purpose slot (302) (303).

47. The method of claim 22, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

simultaneously transmitting its beacon (600) in its previous beacon slot and a special purpose beacon slot (302) (303) for a predetermined number of superframes (100).

48. The method of claim 25, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

simultaneously transmitting its beacon (600) in its previous beacon slot and a special purpose beacon slot (302) (303) for a predetermined number of superframes (100).

49. The method of claim 28, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in a reserved beacon slot (302) (303) for a predetermined number of superframes (100).

50. The method of claim 31, further comprising the steps of:

reserving each of a pre-determined number of beacon slots (204) of said at least one contiguous dynamic beacon period (301) as a special purpose slot (302) (303); and

simultaneously transmitting its beacon (600) in its previous beacon slot and a special purpose beacon slot (302) (303) for a predetermined number of superframes (100).

51. The method of claim 34, wherein said moving step further comprises the step of simultaneously transmitting its beacon (600) in its previous beacon slot and in a reserved beacon slot (302) (303) for a predetermined number of superframes.

52. The method of claim 1, further comprising the step of a device (401) announcing in its beacon (600) the length of the dynamic beacon peri od (703) (753) based on beacons (600) received from other devices and information (604) included in said received beacons (600).

53. The method of claim 2, further comprising the step of a device (401) announcing in its beacon (600) the length of the dynamic beacon period (703) (753) based on beacons (600) received from other devices and information (604) included in said received beacons (600).

54. The method of claim 3, further comprising the step of a device (401) announcing in its beacon (600) the length of the dynamic beacon period (703) (753) based on beacons (600) received from other devices and information (604) included in said received beacons (600).

55. The method of claim 4, further comprising the step of a device (401) announcing in its beacon (600) the length of the dynamic beacon period (703) (753) based on beacons (600) received from other devices and information (604) included in said received beacons (600).

56. A communications network (400) comprising a plurality of devices (401) that include dynamic beacon periods (301) for transmission of their beacon frames (600) by performing the decentralized medium access control method of claim 1.

57. A communications network (400) comprising a plurality of devices (401) that include dynamic beacon periods (301) for transmission of their beacon frames (600) by performing the decentralized medium access control method of claim 2.

58. A communications network (400) comprising a plurality of devices (401) that include dynamic beacon periods (301) for transmission of their beacon frames (600) by performing the decentralized medium access control method of claim 3.

59. A communications network (400) comprising a plurality of devices (401) that include dynamic beacon periods (301) for transmission of their beacon frames (600) by performing the decentralized medium access control method of claim 4.

60. A wireless device (401) that manages beaconing over a medium (410) in a distributed manner, comprising:

an antenna (507) for sending and receiving beacons (600) over the wireless medium (410);

a receiver (502) coupled to the antenna (507) to receive beacons (600) transmitted over the wireless medium (410);

a transmitter (506) coupled to the antenna (507) to transmit beacons (600) over the wireless medium (401);

a beacon processing module (504) to process sent and received beacons (600) for distributed beaconing management over the medium (410);

a processor (503) to divide time into a sequence of at least one superframe (100), each said superframe (100) having at least one dynamic beacon period (301) having a dynamic length with a pre-determined upper bound and that includes a plurality of beacon slots (204), and coupled to:

i. the transmitter (506) and the receiver (502) to send and receive, respectively, beacon frames (600) during said at least one dynamic beacon period (301) of the at least one superframe (100),

ii. the beacon processing module (504) to -

a. manage dynamic beacon period format and length (300) including dynamic determination of dynamic beacon period length, inclusion of a predetermined plurality of beacon slot types (204) (302) (303), recordation of beacon slot occupancy (505) (507) and implementation of beacon slot switches(900) (950),

b. format beacon frames (600) for transmission comprising each of the beacon slot types (204) (302) (303), such that the beacon frame (600)

announces a length (703) (753) of the beacon frame dynamically determined by the device, and

c. format a beacon frame (600) for transmission in the at least one beacon slot (204) (302) (303), that includes beacon slot occupancy information (740) (754, 755) and beacon slot switch information (740) (754, 755).

61. The wireless device of claim 60, wherein:

each superframe (100) further comprises a plurality of medium access slots (203) allocated between said at least one contiguous dynamic beacon period (301) and a data transmission phase (102);

further comprising

a. a bitmap (505) operably connected to said processor (503) and arranged to have at least one bit that corresponds to a beacon slot (204) (302) (303) of said at least one contiguous dynamic beacon period (301), and

b. a memory (508) operably connected to said processor (503) and arranged to store beacon slot occupancy information (507) of each beacon (600) transmitted by said transmitter (506) and received by said receiver (502); and

said beacon processing module (504) further configured to

a. set and reset said at least one bit of said bitmap (505) via said processor (503) in accordance with beacon slot occupancy information in said transmitted and received beacons (600), and

b. store and delete information concerning beacon slot occupancy, dynamic beacon period position (740.i) (755.i) and length (702) (753) that is contained in beacons (600) transmitted by said transmitter (506) and received by said receiver (502).